



Introduction and Guide

READ THIS FIRST

Please read this booklet *before* you start working on any other S104 resources because it provides important information about the module materials, structure and how the various components relate to each other.

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1 Introduction and welcome

On behalf of the module team, welcome to S104 *Exploring science*. We hope that you will have as interesting and enjoyable an experience studying this module as we did in preparing it.

This *Introduction and Guide* serves a number of purposes. It contains everything you need to know in order to get started. It also contains important information about your study of the module and about the assessment. You will need to refer to this *Introduction and Guide* throughout the module, so keep it to hand while you study.

2 What's the module about?

This module will introduce you to concepts and ideas in astronomy, biology, chemistry, Earth sciences, environmental science and physics. It will demonstrate that knowledge in more than one of these areas is often needed in order to tackle a problem or answer a question. Successful study of S104 will enable you, by the end of the module, to answer the following 'big' questions:

- What is causing global warming?
- Why are some countries plagued by earthquakes or volcanic eruptions while others suffer none?
- How do drugs work?
- How does the Sun provide energy for life on Earth?
- Why is biodiversity important?
- How do plants and animals evolve?
- What rules does the Universe follow?
- Might there be life elsewhere in the Universe?

In S104 we aim to develop your knowledge of key areas of science and promote your enthusiasm for study through a wide range of science-based topics. Throughout the module we will encourage you to identify science in the world around you and in everyday life, and to begin to use your knowledge and understanding to talk about topical issues.

You will probably find that you enjoy some parts of the module more than others and we hope the scope of S104 will give you the opportunity to think about areas you may wish to pursue in future study. S104 also aims to teach and develop study skills and science skills so that when you have successfully completed the module you will be well equipped to move on in your chosen study pathway. Many of these skills will also be transferable and useful in employment.

3 What to do first

3.1 Unpack the S104 materials

You may be wondering where to start with all the material that has arrived from the Open University (OU). This section will help, so put everything else aside and read on.

You will receive just one package ('mailing' in OU jargon) of S104 materials. It is vital that you check this as soon as it arrives, so that you know what it contains and can make sure that all the items are present. When you open the mailing start

by finding the *Contents Checklist*, which is usually printed on a yellow sheet of paper, and tick off each item listed as you unpack it. If anything is missing, follow the instructions on the *Contents Checklist* to notify the OU, so that replacements can be sent to you.

Some of the resources you need for the module, including the S104 *Study Planner*, will only be available via the S104 website. It may be useful to print a copy of the *Study Planner* and keep it handy: there is a printable version available at the foot of the online *Study Planner*. It gives all the key dates on your 'learning journey' through the module, including the dates by which your assignments must be received (see also Section 6 of this guide). Details on how to access the S104 website are given in Section 3.3 below.

3.2 Read this *Introduction and Guide*

We suggest that you have a quick look at the section headings to get an overall idea of what this *Introduction and Guide* contains, before working through it in detail. As you read through it, you may like to make a note of any parts that you think you will need to refer back to as you work through the module.

3.3 Before you begin the module

There are a number of things you can do before you begin studying and during week 0 on the S104 *Study Planner*:

- Make sure that you have an Internet Service Provider (ISP) and have familiarised yourself with connecting your computer to the internet using a web browser. If you do not have access to a computer with online access at the start of the module, the OU Library helpline can assist you in locating public access computers. Contact the OU library (see Section 11) or go to http://library.open.ac.uk/libraries/update/access_computers.html to find out if there are suitable facilities near you.
- Now go onto the internet using a web browser, and have a look at your Open University StudentHome page (<http://www.open.ac.uk/students>). To access this you will need your OU Computer Username (OUCU) and password (you will find this information in the letter you received when you first registered with the OU). If you have misplaced or not received this letter, contact the computing helpdesk – see Section 11. Your StudentHome page is specifically tailored to your own needs and interests and can be used to reach all the OU's student resources.
- Follow the various links provided on your StudentHome page and make sure you can locate:
 - Your personal study record for S104 and any other OU current or previous modules
 - The S104 website (note that this will not be open until about 2 weeks before the module is due to start)
 - Your S104 tutor's contact details (once they are available)
 - Your S104 tutor group forum (an electronic forum system where you can send messages to your tutor and other students in your tutor group, available about 1 week before the module begins)

The OU's extensive range of study support resources (under the Help tab on StudentHome). You will be directed to look at some of these resources in more detail when you reach Section 10.1 of this *Introduction and Guide*. For now just note the range of materials available, especially under the headings 'Getting started', 'During your studies', 'Assessments, assignments and examinations' and 'Computing help'.

- Try out the S104 DVDs. When you put an S104 DVD in your computer's DVD-ROM drive it will probably start automatically and you will see the welcome screen (Figure 1). It does not install any software on your computer, although it does assume you have Adobe Flash Player 9 or higher already installed on your PC. (If you do not have at least version 9 you can download the latest version free from the Adobe website <http://www.adobe.com/products/flashplayer>)

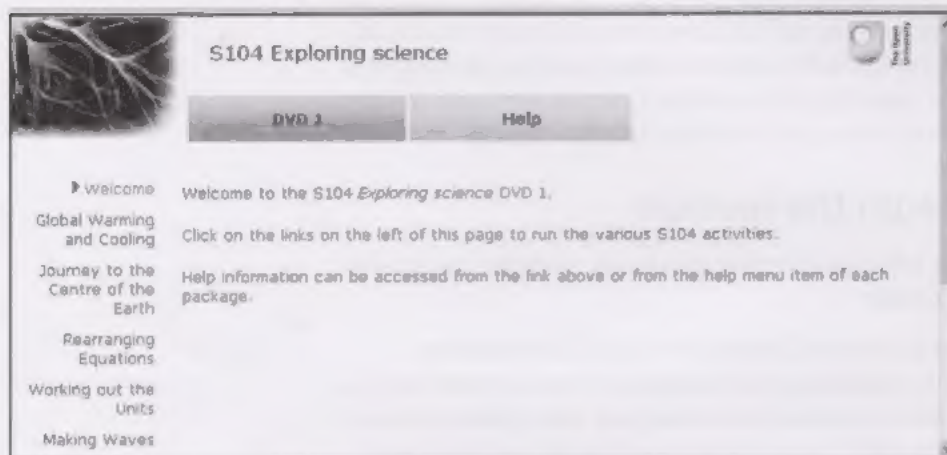


Figure 1 The S104 DVD-ROM Welcome screen.

4 Module components

4.1 Introduction and Guide

You are reading this now! It describes the module and its learning outcomes and assessments and gives useful advice on accessing online resources.

4.2 Module texts

There are eight books in this module:

- Book 1 *Global Warming*
- Book 2 *Earth and Space*
- Book 3 *Energy and Light*
- Book 4 *The Right Chemistry*
- Book 5 *Life*
- Book 6 *Exploring Earth's History*
- Book 7 *Quarks to Quasars*
- Book 8 *Life in the Universe*

There is a *Glossary* of terms highlighted in bold type in the books. This is included in your mailing of resources but it can also be viewed on the S104 website.

4.3 The S104 website

The S104 website provides you with an online 'home' for everything that relates to studying S104 *Exploring science*. Follow the link to the S104 website from your StudentHome page at <http://www.open.ac.uk/students>.

You will first need to sign in with your OU Computer Username (OUCU) and password (see Section 3.3 of this guide). An example of the opening screen is shown in Figure 2.

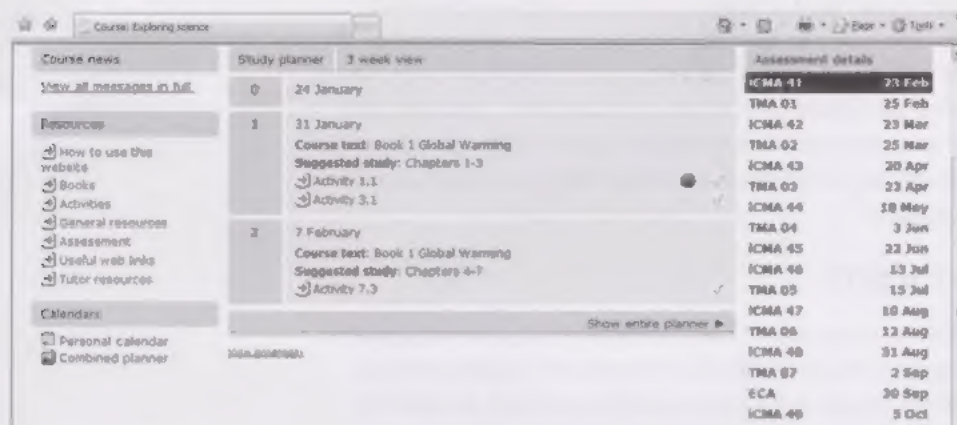


Figure 2 The 'front page' of the S104 website.

From here you will be able to access electronic versions of all the printed resources (click on the Books or General resources link), assessment material (click on the Assessment link), and even advice on how to use this website, as well as a range of online resources (click on Useful web links). The Activities link will be where you go to access specific instructions for many of the activities that you will meet during your study.

As the module team's main method of communication with you will be via the News section on this website, you should visit this section at least twice a week to check for the latest S104 news and information.

4.4 Study Planner

The *Study Planner* is provided as an online resource on the S104 website. This gives all the key dates in the study period to help you keep on track.

The online calendar on the S104 website is available in three different 'views': the study planner, the combined planner and the personal calendar. The standard view is the study planner but you can select the different views by clicking on the buttons on the left-hand side of the planner (under the Calendars section). The study planner view opens up first when you go to the S104 website and has links directly to module activities, assessment and other resources. The combined study planner is particularly useful if you are studying another module at the same time as S104; it can show the study calendars for up to three modules side by side. The personal calendar shows a month-by-month calendar with highlighted key events, and you can select one of the four icons in the Event key (on the top right-hand side of the screen) to change the view: global events (university or Regional/National events), module events (S104-specific deadlines), group events (such as regional day schools or information from your tutor about events in your tutor group forum), and finally a personal calendar where you can upload any important personal deadlines affecting your study (select 'new event' to load a new window where you can add information).

You will probably find it helpful to use the online *Study Planner* throughout the whole module – you will be referred to it very early in the module (Book 1, Activity 1.1), when you are asked to prepare a detailed plan for your own study time. You may find it useful to upload your completed detailed study plan to the personal calendar so that it is available to you each time you access the S104 website.

4.5 DVD-ROMs

Seven of the eight books have associated resources that are supplied on DVD-ROM. Some of the resources are video sequences which can be viewed either on a computer or on a domestic DVD player attached to a television. However, some of the resources are interactive and must be studied on a computer, because you will need to use a keyboard or mouse and be connected to the internet to interact with them. The resources form part of the book activities that you are required to complete as you study the module.

4.6 Tutor group forum

While studying S104 you will be expected to keep in touch with your tutor and other students in your tutor group by using the OU's electronic forum system. Your tutor group forum enables you to send messages that can only be read by those in your own tutor group. You can link to your forum via the S104 website. Your tutor group forum will be an important communication route where your tutor will provide tuition support and where you will post results and discuss some of the module activities so it is very important that you engage with it as soon as it is 'open' (shortly before the module start). For more information go to Section 7.2 of this *Introduction and Guide*.

4.7 Practical Kit

You will have received a Practical Kit in the module mailing. The Kit consists of a number of rock and mineral specimens and various other items used for practical activities throughout the module. It is important that you familiarise yourself with the various items in the Kit, and check that nothing is missing. You can do this by going to the S104 website, selecting General resources and scrolling to the Practical Kit section. Here you will find a key to what should be included in your Kit. The first occasion you will need to use the Kit is for Book 2 Activity 5.1, so you should ensure that your Kit is complete as soon as possible (we suggest that you do this during study week 0 on the *Study Planner*). If any items are missing you should contact materials despatch (see Section 11 of this guide).

4.8 What you need to provide

To study this module you need to provide the following items:

- A basic scientific calculator (it will normally include buttons labelled 'sin', 'cos', 'tan'). It is important that you know how to use your calculator properly (referring to the operating instructions if needed). If you need to buy a new scientific calculator, you are advised to get the cheapest one available as it will be sufficient for this module. If you are unfamiliar with using a scientific calculator you may wish to practise by working through the material in Section 10.2 of this guide.
- A computer with a DVD drive and connection to the internet. Details of the computer specification are given online at:
http://www3.open.ac.uk/study/atoz/pc-specification/pc_req_4.htm

- You will also need a number of everyday items in order to carry out the various practical activities in the module. These are listed in Section 8.1.1 of this guide. Make sure that you have access to each of the items listed for each book *before* you begin to study that book. You may even want to check the list now.

5 Learning outcomes

All Open University modules have a set of learning outcomes which are statements of what a student is expected to know, understand and be able to do at the end of the module. Learning science is not just about knowing subject-specific details but also about developing the skills necessary to use this subject knowledge. Assessment activities will give you opportunities to show how you are working towards the learning outcomes for S104. They also give your tutor a framework against which specific feedback can be given on your progress. You will be encouraged to monitor and assess your own progress as you work through the module and identify where you may need help. The learning outcomes provide a language that helps you recognise and express your own achievements.

You will see that the learning outcomes are clustered in four groups:

- knowledge and understanding relate to the content and subject matter of the module
- cognitive or thinking skills are associated with analysis and synthesis of the module content
- key skills are more general and include your ability to communicate, use relevant ICT (information and communication technologies) and information literacy and mathematical skills
- practical skills relate to the subject area.

The list of module learning outcomes that follows is a summary of what you should know, understand and be able to do once you have completed S104 *Exploring science*. The module provides opportunities for you to develop and demonstrate these learning outcomes. Your tutor will give you feedback (on your written assignments) on how well you have demonstrated the learning outcomes specified for each assignment.

Such a list may appear rather daunting when you begin the module, particularly as not all of the terms used may be ones with which you are familiar. Don't panic! As you move through the module we will begin to unpack the detail underlying these learning outcomes and we will encourage you to identify and record your progress in developing your knowledge and skills.

Learning outcomes for S104

Knowledge and understanding (Kn)

In the context of the topics covered in S104, you should be able to demonstrate knowledge and understanding of:

- Kn1 facts, concepts, principles, theories, classification systems and language used in science including astronomy, biology, chemistry, Earth sciences, environmental science and physics
- Kn2 accuracy, precision and uncertainty
- Kn3 the role of science in the world around us and in everyday life.

Cognitive skills (C)

- C1 describe, analyse and interpret scientific information and data presented in a variety of ways, including texts, tables, graphs, diagrams and figures, numerical and mathematical descriptions, computer-based media
- C2 apply knowledge and understanding of scientific concepts to address familiar and unfamiliar problems

Key skills (Ky)

- Ky1 use mathematical skills appropriate to the study of science at this level
- Ky2 process and present data using appropriate qualitative and quantitative techniques and methods of presentation (including graph plotting)
- Ky3 communicate scientific topics clearly and concisely, using methods and scientific language appropriate to your purpose and audience
- Ky4 use information technology to learn and communicate
- Ky5 monitor progress and development of effective learning strategies.

Practical skills (P)

- P1 make and record observations and measurements and report results.

6 Assessment

Three types of assessment contribute to your overall module score:

- Seven assignments (called tutor-marked assignments or TMAs and available from the S104 website) that you send to your tutor, each relating to one or more of the module books.
- Nine interactive computer-marked assignments (iCMAs 41–49), completed and submitted online, the last of which (iCMA 49) will include questions covering topics from all eight books.
- An end-of-module assessment (EMA) that will draw on knowledge and skills developed across the whole module.

You will find information on how to submit the assignments on the S104 website in the Assessment section. The dates by which you must submit your assignments are given in the module *Study Planner*. These dates are important, so it would be wise to make a note of these now. Note also that the assignments will not all be on the S104 website at the beginning of the module; they will be made available at various points during the module.

The assessment is in two parts. Part 1 comprises TMAs 01–07 and iCMAs 41–49. Part 2 comprises the end-of-module assessment (EMA). You will sometimes see Part 1 referred to as the overall continuous assessment component (OCAS) and Part 2 referred to as the overall examinable component (OES) of your module score.

Your final result notification will refer to OCAS and OES and, in order to be sure of passing the module, you will need to obtain 40% of the marks available on both the OCAS component and on the OES component. You will be awarded a distinction grade if you achieve 85% or above in both parts.

From your StudentHome page, you can access the Assessment Calculator that helps you see how you are progressing with your assessment scores. You can also access from StudentHome full details of the Assessment Strategy for this module by clicking on Assessment and then on Assessment Strategy.

Note that there is no substitution for any S104 assignments. Some OU modules allow students to 'substitute' an average score for missing or low scoring assignments, but this is not the case in S104. If you choose to miss an iCMA or a TMA, you will receive no marks for it. All the assignments count towards your overall score for the module.

Throughout the module there will be opportunities for self-assessment. These may be in the form of short, in-text questions within the resources where you are encouraged to pause for thought, or longer questions where, for example, you may need to gather information, write a summary, draw a diagram or do a calculation.

6.1 Writing in your own words

The purpose of assignments is to assess your understanding and this can only be done if it is your own work and you use your own words. For this reason, copying someone else's work without making reference to the author is regarded as cheating and is forbidden.

You may have seen in current press reports there is concern among Higher Education institutions about increasing awareness of cases of plagiarism. This primarily takes one of two forms: (i) students misusing information from the web or other reference sources, where they 'cut and paste' sections of text or diagrams from these resources directly into their assignments without acknowledging the original source; and (ii) students working too closely with one or more individuals to help solve and/or answer an assessed task or question, resulting in the production of a joint answer or solution (whether intentionally or not) to gain an unfair advantage over others in their assignments. This form of plagiarism is called collusion.

When you write, you should use your own words and keep your writing straightforward and to the point. Further guidance on how to reference a variety of sources of information will be provided as you progress through the module.

To help you understand and avoid plagiarism, work through the resources on writing in your own words in the section 'Write like a professional' on the University's Skills for Study website before you begin your first TMA. You can find this at: <http://www.open.ac.uk/skillsforstudy/activity/writing-in-your-own-words>

You can also find useful information about plagiarism and referencing on the 'Developing good academic practices' website at: <http://learn.open.ac.uk/site/dgap001>

To check students are working in a fair and academically appropriate manner, the Open University is currently using two types of text-comparison software to detect potential cases of plagiarism in work that is submitted for assessment. These are:

CopyCatch, which compares work submitted by one student with assignments submitted by all other students on the module (as well as previous presentations of the module where appropriate). It can also be used to compare each student's assignments with the module materials and other commonly used or provided references. The main use of CopyCatch is to check for cases of collusion.

Turnitin, which carries out the equivalent of an internet search, looking for matches between the text included in a piece of work submitted by a student with all forms of information and resources publicly available on the internet. The main use of Turnitin is to check for cases of direct copying, 'cut and paste' and/or not properly referencing various types of source materials.

When using these systems, the Open University will not submit any personal details about you to either of them, although it is likely your work will have your PI number on it from which you can be identified. Furthermore, your work will not be stored on any external system and so will not be accessible to anyone outside of the Open University.

For each assignment submitted to Turnitin, an 'originality' report is produced showing the percentage of text that matches specific websites. CopyCatch meanwhile produces 'similarity' reports between matched pairs of scripts. These reports will be made available to the module team and in some cases they may decide to take the matter further. This may result in some further guidance about academic conduct and support to avoid any further incidents, or if more serious may result in further action taking place.

Depending on the questions being asked and the format of the submitted answer, some level of matching between scripts and with other sources is expected. For example, you may have used information obtained from other sites and/or scientific papers as a direct quote to support your answer or illustrate a particular point (making sure that you have referenced this in the appropriate and expected manner). Likewise, you will probably use terms and phrases, which can be described as 'common knowledge' within your particular subject area and level of study, which do not need to be referenced, but are likely to arise in a similar format on a number of sites and other student's answers. The module team will take all such matters into account when reviewing each of the reports and deciding whether a student has plagiarised.

It is essential that you do not post any TMA, iCMA or EMA questions or answers on any websites or newsgroups on the internet (and this includes selling scripts on eBay).

For more information about plagiarism policy at the Open University you should refer to your assessment handbook or the student policy page on the OU website at: <http://www.open.ac.uk/student-policies/index.shtml>.

6.2 TMAs

TMAs (tutor-marked assignments) will only be available online from the S104 website. You will not receive printed copies in the mailing. Check that you can locate TMA 01 (on the S104 website in the Resources section – click on Assessment) when you are next online. You will notice that the learning outcomes that are being assessed in each TMA question are listed, and in some cases expanded, to show particular things that each question is seeking.

Some TMA questions may relate to tutor group forum activities so you will need to plan in advance to participate in your tutor group forum at the correct time.

6.2.1 TMA submission

Your TMAs should be submitted through the eTMA system unless there are some difficulties which prevent you from doing so. In these circumstances, you must negotiate with your tutor to get their agreement to submit your assignment on paper. The eTMA system allows for eTMA submission directly to the university 24 hours a day, and either gives you confirmation that your eTMA has been submitted successfully or, if there has been a problem, an error message informing you of the problem and what steps you can take to overcome it. Note that submitting an eTMA is not the same as sending a TMA to your tutor as an email or as an attachment to an email, neither of which are permitted.

There is a link to the online TMA/EMA service on the S104 website and on-screen guidance is provided as you submit. All the information you need in order

to submit your assignments is provided in the Assessment Handbook which you can access from the Assessment area of the S104 website.

All the information that you need in order to submit your assignments should be here in the *Introduction and Guide* (i.e. module-specific information), on-screen as you submit, or in the Assessment Handbook that you can access from your StudentHome page.

Of particular importance is the test submission, TMA 00. This will not only enable you to familiarise yourself with the system but also allow your tutor to check that the format in which you will be saving your TMAs is compatible with their own computer software. It is your responsibility to make sure that you submit documents in the compatible format and we strongly recommend that you submit TMA 00. TMAs which are submitted in the incorrect format may not be marked.

It is essential that mathematical arguments and/or chemical equations or structures are set out correctly – allowance cannot be made if you word-process a mathematical argument or chemical equation but do not know how to produce proper superscripts or subscripts, such as 10^{-1} or Cl_2 . If you do not have access to the necessary computer software and/or you do not possess the necessary ICT skills to do this within a word-processed document, then you have may need to try a different approach: You can find help with these alternative approaches on the website under 'Assessment'.

You could electronically scan your hand-generated diagrams, mathematical arguments or chemical equations/structures and then incorporate the resulting images into a word-processed document which you submit as an eTMA (you will not lose marks for submitting your work in this way – you are not expected to use computer drawing packages but you can do so if you wish). However, you do need to be aware that this can increase the size of files considerably. If you encounter difficulties submitting electronic files, then you should contact the Computing Helpdesk (details in Section 11).

6.2.2 Late submission

The *Study Planner* specifies the date (called the cut-off date) by which each of your TMAs must be received unless you agree a late submission date with your tutor. Note that if you need to request late submission:

- you must explain your reasons to your tutor before the cut-off date
- your tutor must be convinced that your reasons are both appropriate and genuine
- your tutor will authorise an extension of more than 7 days only under exceptional circumstances
- your tutor is not allowed to give an extension of more than 21 days under any circumstances
- an extension of more than 21 days can be authorised only by your Regional/National Centre
- permission to submit a TMA more than 7 days after the cut-off date will not normally be granted for more than a total of two TMAs on S104
- It is not usually possible to be awarded an extension for the final TMA of the module, as this may interfere with the preparation of your end-of-module assessment. However, if you have serious extenuating circumstances, please contact your tutor in the first instance.

6.3 iCMAs

In addition to the TMAs, S104 includes nine iCMAs (interactive computer-marked assignments). You will be provided with immediate computer generated feedback on your iCMA answers, so you can use them to help inform you about your knowledge, understanding and skills. Most of the questions allow a second and third attempt at an answer, so you can learn from the feedback provided before having another go. We suggest that you look at the questions when they are first available and revisit them at various times during your study of the relevant book, answering them in stages as you complete your study of each section, in order to check your understanding.

Each iCMA is available for several weeks and you can spend as long as you wish on the questions within that time. You do not need to complete all the questions in one go; you can access the iCMA as many times as you wish while it is open. However, each iCMA has a cut-off-date (given in the *Study Planner*). You must submit the assignment, by pressing the Submit button, on or before the cut-off date, whether or not you have completed it, otherwise your score will not be recorded and will not contribute to your final module score. Your tutor cannot grant you an extension and no late submissions will be accepted.

The final iCMA (iCMA 49) is longer and more complex than other iCMAs. Completing this iCMA will help you to prepare for the end-of-module assessment, so completion and submission of this iCMA is strongly encouraged.

Instructions for accessing and using the iCMAs

- The iCMAs are accessed from the S104 website.
- You need to be online while you are working on an iCMA, but you can take breaks whenever you like. If you break off from the assignment part way through, when you resume the iCMA you will be taken back to exactly the point where you stopped working and your answers to the questions you have already completed will have been retained, such that you can carry on where you left off. You can access an iCMA as many times as you wish while it is open.
- The answers to the questions are short and can be entered onto your computer in a straightforward and unambiguous way. However, you will need to do some working for most of the questions, so you should have your calculator and a pen and paper with you all the time you are working on the iCMAs. You may also like to have the S104 material to hand, for ease of reference. Working online tends to encourage people to guess the answers to questions. We would urge you to resist this temptation; time spent methodically working out each answer is time well spent.
- If you would like the text of an iCMA to be displayed in larger font or with a different background colour etc., select **Display options** in the top right hand corner of the screen. (See Figure 3.)
- While working through the questions, select **Enter answer** to check your answer, **Try again** to attempt a question for a second or third time and **Next question** to move on to the next question. You are advised *not* to use the 'Back' function on your web browser.
- If you would like further guidance on how to input your answers to the questions, select **Help** in the top right hand corner of the screen (see Figure 3)
- The questions will be presented to you in sequence. Most questions allow up to three attempts (the number of attempts is stated at the top of each question). Feedback is provided after each incorrect answer. After you have answered a

question correctly, or made three unsuccessful attempts at answering it, you will be told the correct answer and then you will have to move on to the next question.

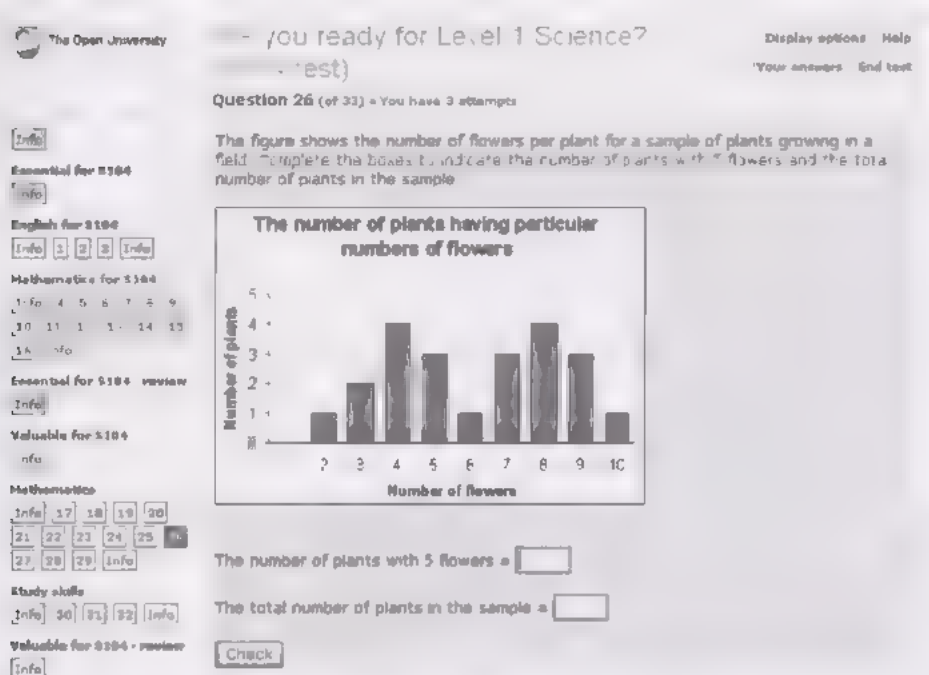


Figure 3 An example of an iCMA question.

- It is important that you aim to get the correct answer with a minimum number of attempts – you will obtain more marks for getting the answer correct at your first attempt than at your second, and more marks for getting the answer correct at your second attempt than at your third.
- Although the questions are presented to you in sequence, it is possible to attempt most of them in any order. To move to a different question, select the relevant question number on the left-hand side of the screen. There are some questions which must be attempted in a particular order; in these cases a question will be 'greyed out' and you will not be able to read it until you have completed the previous question.
- You are strongly advised to attempt all the questions.
- You will not be given exactly the same questions as other students or your tutor, so if you want to query a point with your tutor, remember to make a note of the question you were asked and any responses you believe you made.

When you have completed the iCMA remember to select the Submit button otherwise your mark will not be recorded. The Submit button is located at the bottom of the summary screen. If you have worked through the iCMA in order, the summary screen will appear automatically once it is completed. If you have answered the questions out of order then it can be accessed at any time by selecting End test (in the right-hand corner of the screen). Check that you have completed all the questions that you want to before selecting Submit, since once you have selected Submit you will not be able to attempt any more questions.

Remember that you must submit the iCMA on or before the cut-off date. Note that the cut-off date for each iCMA in the *Study Planner* is the *latest* date on which the assignment will be accepted, and that no extensions are possible. You are advised to start work on each iCMA in plenty of time rather than attempting it in a rush just before the cut-off date.

Note that you will not be able to see your score as soon as you submit an iCMA. The score for each iCMA will be displayed on StudentHome about 10 days after the cut-off date for that iCMA.

iCMA 49 is longer than the other iCMAs and will include questions from across the whole module. We expect that, in preparing for this and the end-of-module assessment, you will use the notes you have taken during your study for revision purposes and revisit key points, bringing together the knowledge and understanding and skills you have developed.

You may find you need to refer back to this section of the guide until you are familiar with submitting your work electronically.

6.4 End-of-module assessment

The end-of-module assessment is a larger piece of work than any of the TMAs and carries more marks. It may be submitted either electronically or on paper (by post, to the University) by the date shown on the *Study Planner*.

This assessment will provide the opportunity for you to demonstrate a wide range of knowledge, understanding and skills in a written context.

You should follow the instructions in *Submitting examinable work electronically* or *Submitting examinable work on paper* which will be available online via the Assessment section of the S104 website (you can access this from StudentHome). You will be sent further information on how to submit your EMA 4 to 6 weeks before the cut-off date.

6.5 Special circumstances

If circumstances arise that prevent you submitting a TMA or iCMA at all or result in you having to submit an assignment which is incomplete or otherwise well below your usual standard then you should consider reporting the circumstances to the University so that the S104 Examination and Assessment Board can bear them in mind as it determines your module result.

Details concerning the submission of special circumstances information are given in the *Assessment Handbook* (available via your StudentHome page).

If you experience severe problems in preparing the end-of-module assessment, or if you need to request an extension or deferral you should follow the procedure given in *Submitting examinable work electronically* or *Submitting examinable work on paper* which will be available online at <http://www.open.ac.uk/assessment/> before the EMA cut off date. (Go to the bottom right-hand corner of the page and select the relevant PDF file.)

It is not possible to arrange extensions for iCMAs under any circumstances.

We hope you will not have to refer back to this section of the *Introduction and Guide* – but remember that it exists in case you need to use it!

7 Support for your studies

You are not expected to study alone. Support will come from your tutor, other students in your tutor group, through tutorials or day schools, online forums and

the S104 website (which you should check regularly for important news and information). If you experience difficulties that are not directly related to the module content, you may wish to contact the Study Support Team at your Regional/National Centre.

7.1 Support from your tutor

You are one of about 20 students allocated to a tutor (Associate Lecturer) for the module. He or she will support your learning throughout the module and will also mark your TMAs. Your tutor will also provide online support via your tutor group forum. You can contact your tutor by telephone, email or by posting a message on your S104 tutor group forum. We encourage you to establish contact with your tutor as soon as you know who they are by sending an email or making a telephone call. Open University tutors are extremely dedicated people who want to help you with your studies, so don't hesitate to contact them for help or advice.

Do please be aware, though, that Open University tutors are expected (and paid) to spend only a limited amount of their working time on any particular module. In the case of S104, tutors are expected to work an average of 6.5 hours per week for the duration of the module. This time includes marking TMAs, preparing and delivering tutorials or day schools, preparing for and facilitating a number of tutor group forum activities and supporting their students more generally. You should not, therefore, have unrealistic and unreasonable expectations about how quickly your tutor ought to respond to any queries that you might raise – despite the prevalence of apparently 'instant' electronic communication. Tutors will probably log on to the tutor group forum and email system a few times in most weeks. If your query is of general applicability, they may well decide that it is best responded to in the tutor group forum so that other students can get the benefit of any advice offered.

7.2 Your tutor group forum

You will be allocated, with the other members of your tutor group, to an electronic tutor group forum where you can ask questions, discuss the module and participate in online activities, for example posting the results of experiments. Online forums are rather like a group email system. For example, you can send messages to your tutor group forum and these can be read by all members of your tutor group.

The online collaborative activities in the module will also take place in your tutor group forum. You should check your tutor group forum and the S104 news area on the S104 website at least twice a week. Your tutor will also lead a number of tutorial activities online. Depending on the geographic location of the whole tutor group, you may have opportunities to participate in face to face tutorials or day schools with your tutor and tutors for other groups of students.

We recommend that you check that you can access your tutor group forum before the module begins (via the link on the S104 website). It should be 'open' to begin discussion about a week before the module start date.

7.2.1 Behaviour in online discussion forums

The OU has a responsibility to maintain an educational environment where all students feel they can participate without fear of being ridiculed, abused or upset. Your responsibility is to try to communicate in a reasonable manner and to help maintain a friendly, supportive environment. The OU owns the network on which you are communicating and if a person's behaviour becomes unacceptable the University has the right to exclude that person from the network. By signing up

for this module you are also signing up to the OU *Computing Code of Conduct*, one of a number of useful documents that you can find by following the Policy documents for students link on your StudentHome page.

7.3 Software to support your OU studies

The University supplies a variety of software that is free for you to load onto your computer. The following can be downloaded from the OU Computing Guide at <http://learn.open.ac.uk/course/view.php?id=4955> or from StudentHome (click on the 'Help' tab then select Study Support under 'Services' at the bottom of the page; you will find software downloads under 'Your computer').

- Adobe Reader, which enables you to read files in the PDF format.
- Open Office, which includes a word processing and spreadsheet program that you can use if you don't already have Word or Excel loaded onto your computer.
- Firefox, a web browser which will enable you to access all websites, including the ones containing the online iCMAs, if you don't have Internet Explorer loaded onto your computer.
- Adobe Flash Player, which you will need to run some of the computer-based multimedia packages on the S104 DVDs.

Information about downloading this software is available from the S104 website

If you need more help with any aspect of using your computer to study the OU's *Computing Guide* at <http://learn.open.ac.uk/course/view.php?id=4955> is the best place to start. If you get stuck, contact the OU Computing Helpdesk (see Section 11).

8 Module activities

To help you plan your study, activities are numbered and the time we expect each activity to take is indicated in the book and on the *Study Planner*. Icons are printed in the margin of the book if an activity requires use of a computer to run a DVD or for online work, or is a practical activity, so that you can easily identify when you require access to a computer or when you need to gather Kit or non-Kit items.

A list of all activities will be given on the S104 website with more detail of how to access some electronic resources, where required.



8.1 Practical activities

Practical work is very important in understanding and learning science and is an integral part of S104. A variety of activities that you can carry out at home provide opportunities to develop your practical skills and some of your work will be assessed, enabling you to demonstrate the learning outcome P1 'make and record observations and measurements and report results'.

To further develop practical knowledge and skills that require access to laboratories or field sites and more specialist equipment you may wish to study the separate module SXR103 *Practising science*, with its residential school in the summer. If you are interested in experimental science but would prefer not to attend a residential school then you might like to consider studying S155 *Science investigations*. You can find out more about *Practising science* and *Science investigations* by following the link on the Useful links page of the S104 website.

In addition to the Practical Kit that you will have received with the module mailing, there are a number of everyday items that you need to provide in order to carry out the practical activities in the module. You should ensure that you have these available in good time and they are listed here.

8.1.1 Equipment list for practical work

The non-Kit items you need to provide for practical work are listed below for the book in which they are first required; note that some items will be needed on more than one occasion and for work associated with later books.

Book 1

- two open-topped, straight-sided, flat-bottomed containers (e.g. plastic bottles)
- funnel (or plastic bottle to make funnel)
- ruler marked in millimetres

Book 2

- sticky labels/tape for labelling the specimens
- vinegar (optional task)
- empty jam jar or similar (optional task)
- paper
- scissors

Book 3

- electric kettle (with power rating marked on it)
- kitchen scales (or measuring jug)
- watch or clock that indicates seconds
- tungsten filament light-bulb (40W or 60W)
- energy-saving light bulb
- Anglepoise® lamp or table lamp
- cardboard box (empty cereal box or stiff cardboard)
- dark cloth or cardboard
- modelling knife or sharp scissors
- insulating tape or kitchen foil
- paper protractor (A copy is supplied on page 27 of this booklet or it can be printed from S104 website)
- reusable adhesive or modelling clay (Blu-Tack™ or Plasticene®)
- 50 cm dark coloured thread or thin string
- pin or needle
- drawing pin
- torch

Book 4

- empty glass jam jar
- pinch of table salt
- coarse sea or rock salt
- pencil
- graph paper (marked in millimetre squares)
- small containers to hold test solutions (empty yoghurt pots or plastic lids)
- teaspoons
- lemon juice or other fruit juice

vinegar
washing powder
baking powder
bicarbonate of soda
sparkling mineral water
household cleaning fluids (floor cleaner liquid, ordinary household bleach)
washing-up liquid or dishwasher powder
personal washing solutions (shampoo, soap, etc.)

Book 5

small can of tomato soup
rectangular plastic container
means of labelling the plastic container
cling film
ruler or other measuring device

Book 6

ruler marked in millimetres
graph paper (marked in millimetre squares)
paper tissue or similar
large steel nail (large enough to hold easily and scratch a surface of a rock)
clear glass jar with tight fitting lid
old spoon, old fork
soil

8.2 Safety when conducting practical work

When carrying out any practical activity you should always take care to observe the safety precautions highlighted in the module book. Very often these precautions will seem quite obvious and just a matter of using common sense. However that does not mean that you should ignore the safety instructions. The Open University has a duty to give advice on health and safety to students carrying out any activities that are described in the module. Similarly, you have a duty to follow the instructions and to carry out the practical activity having regard for your own safety and that of other people around you. Whenever you do practical activities you should think about the hazards involved, and how any risks can be minimised.

The following safety precautions apply to all practical activities. When there are other precautions specific to an activity, these will be printed in the module book. First aid advice is also provided below.

8.2.1 Important safety precautions

Take note of the following safety precautions, which apply to all practical activities:

- Keep children and animals away while you are working.
- Clear your working area of clutter. Put all food away. Ensure there is nothing to trip over underfoot.
- Always wash your hands thoroughly after a practical activity.
- Any household items used should be thoroughly cleaned before returning them to domestic use.

8.2.2 Accident and first aid advice

You should have the following accident and first aid advice easily to hand when conducting practical work.

Fire

In the event of a fire, switch off and disconnect any electrical equipment, cover the fire with a wet towel or dry earth or sand. Shut all windows, doors and vents. Evacuate everyone in the house/building, close the door behind you and telephone the fire service.

Clothing on fire

Get the person affected to lie down, and smother the flames by rolling the person in a carpet, blanket, overcoat, etc. Obtain medical help immediately.

Electric shock

Switch off the source of the current and remove the person affected with an insulated lever. Make them lie down and keep them warm. Obtain medical help quickly if they lose consciousness or have difficulty in breathing. If you are trained to do so begin artificial respiration immediately if breathing ceases.

First aid advice

In the unlikely event of a mishap that results in a cut, burn or shock please refer to the standard first aid information below.

Cuts

If you cut yourself badly, try to reduce the blood flow by putting a pad of clean tissue or cloth over the wound and pressing gently, but firmly, raising the limb, until the flow stops. Obtain medical aid if necessary.

Burns and scalds

The notes below act as a simple guide for the First Aid treatment of burns and scalds.

- (a) DO NOT prick any blisters;
- (b) DO NOT apply ointments or oil-based dressings.
- (c) DO NOT remove anything sticking to the burn.

If you have any concerns, seek medical aid immediately.

The First Aid treatment of burns and scalds is designed to achieve three basic aims:

1 To get rid of residual heat

The affected area should be immersed in or held under gently running cold water for at least ten minutes or longer if cessation causes the pain to return. This treatment will relieve the pain and help to reduce the severity of the final injury.

2 To prevent infection

Avoid handling a burn unnecessarily, especially if the skin is broken. Remove any clothing not sticking to the burn and cover the area with a clean, dry dressing. Restrict the movement of badly burned areas.

3 To treat for shock

Shock

Patients in shock should be kept warm and as comfortable as possible in a reclining position, with legs raised. Give nothing by mouth and obtain medical aid.

9 Getting started on S104 *Exploring science*

If you have just worked through all the detail in the previous sections, you may be beginning to wonder when you are actually going to begin studying the science in S104.

Now is the time to plan when you will start work on Book 1. The *Study Planner* shows the period scheduled for this part of the module in which tutor support for it will be focused and when the assessment related to it should be submitted, but if you are able to get going before the start date and 'get ahead' of the *Study Planner*, experienced OU students and Associate Lecturers will all encourage you to do so – this allows some contingency time to cope with any unexpected events that might interfere with your study plans later. Book 1 will help you with your study planning, so we suggest you move onto that as soon as you have successfully completed all the actions in Section 3.3 of this guide.

The remaining sections of this *Introduction and Guide* suggest things you can do to prepare for study and whom to contact if you have problems. How much of the preparation is relevant to you will depend on your previous study experience and whether you have already used some of the Open University resources and systems. We encourage you to skim through the following section now, note what is there and decide what is appropriate for you to follow up now or at a later date.

Then you should be ready to begin studying the module. Enjoy!

10 Preparing for study

We hope that you have already worked through the online 'Are you ready for Science study?' diagnostic materials and are confident that you are adequately prepared for S104, particularly with the relevant mathematics skills. If you have not used the quiz yet, please do so now by visiting

<https://students.open.ac.uk/openmark/science.level1ayrf.general/>

If you would like to continue to revise your maths skills ready for S104, you are advised to use the *Maths Skills* ebook, available on the S104 website (follow the General resources link) and also on StudentHome under

<http://www.open.ac.uk/skillsforstudy/maths-skills-ebook-for-science.php>.

Brushing up on your mathematical skills prior to starting the module is probably the most important preparation that you can do.

In addition to ensuring that you can do the things described in Section 3.3 and practising using the eTMA system (Section 6.2.1) you may find some additional skills preparation helpful.

10.1 Study skills resources

You can access online study skills resources from your StudentHome page by selecting the Help tab and selecting 'Study skills' from the 'During your studies

section' where you can access information on a variety of study skills, including advice and activities. You can also access the 'Skills for Study' website directly at: www.open.ac.uk/skillsforstudy. This website contains much more guidance and you can listen to and watch audio and video programmes and engage with interactive exercises. You can download most of the booklets and some may be requested from your Regional/National Centre. These booklets are especially useful for accessing advice quickly and easily when you need it.

The link 'PC4Study' at <http://www.open.ac.uk/pc4study/> is also useful for reference and is well worth working through before you start study of S104.

Don't forget to look at the resources on writing in your own words in preparation for your first TMA.

10.2 Practice using your scientific calculator

No single specific calculator is recommended for S104, which means that students studying the module are using a wide range of calculators. Each of these probably has a subtly different way of working, so we have not attempted to provide comprehensive instructions on how to use your calculator. To give you an indication of the different ways in which different calculators operate, the following list (which is not intended to be exhaustive) explains how three specific calculators can be used for several specific calculations. Some calculators show some intermediate working on their display but, for simplicity, we have not included this. In addition, each keystroke is listed as if it just requires the pressing of a single button. Some of them are actually 'second functions' so you would need to press the 'Shift' or '2nd' button first. These guidelines, combined with the manufacturer's operating instructions for your calculator, should enable you to use your calculator effectively in your study of S104.

The three calculators are:

- **Calculator 1** The Casio fx-991 (an inexpensive modern scientific calculator).
- **Calculator 2** The Texas Instruments TI-30XA (a simple scientific calculator that is the calculator for the Open University module Y162 *Starting with maths*);
- **Calculator 3** The Windows Calculator (likely to be installed on your computer already, and available under 'All programs' then 'Accessories'). Note that you should set the calculator to operate in scientific mode by selecting 'View' then 'Scientific'.

Simple calculations

To find $3 + 2 \times 4$:

- On Calculator 1 you should press
'3' then '+' then '2' then '×' then '4' then '='
- On Calculator 2 you should press
'3' then '+' then '2' then '×' then '4' then '='
- On Calculator 3 you should press
'3' then '+' then '2' then '*' then '4' then '='

The answer, on each occasion, should be given as 11. Calculators 1 and 2 'know' the rule that multiplications should be done before additions, as does Calculator 3, but only when it is set to operate in scientific mode.

Calculations with brackets

To find $(3 + 2) \times 4$:

- On Calculator 1 you should press
'(' then '3' then '+' then '2' then ')' then '×' then '4' then '='
- On Calculator 2 you should press
'(' then '3' then '+' then '2' then ')' then '×' then '4' then '='
- On Calculator 3 you should press
'(' then '3' then '+' then '2' then ')' then '*' then '4' then '='

The answer, on each occasion, is given as 20.

Raising a number to a power

To find 2^6

- On Calculator 1 you should press
'2' then 'x[■]' then '6' then '='
- On Calculator 2 you should press
'2' then 'y^x' then '6' then '='
- On Calculator 3 you should press
'2' then 'x^y' then '6' then '='

The answer, on each occasion, is given as 64.

Inputting negative numbers

To find $117 - (-38) + (-286)$:

- On Calculator 1 you should press
'117' then '-' then '(-)' then '38' then '+' then '(-)' then '286' then '='
- On Calculator 2 you should press
'117' then '-' then '38' then '+⊖-' then '+' then '286' then '+⊖-' then '='
- On Calculator 3 you should press
'117' then '-' then '38' then '+/-' then '+' then '286' then '+/-' then '='

The answer, on each occasion, is given as -131.

Expressing answers in scientific notation

Suppose that you have done a calculation (e.g. 2500×8000) and the answer is 20 000 000. To express this number in scientific notation (2×10^7) you should do the following:

- On Calculator 1 you should press 'Set up' then '7' (for scientific notation) then a number between 0 and 9 for the number of digits you would like displayed. If you press '3' the answer then appears as 2.00×10^7 . To return to non-scientific notation press 'Set up' then '8' (for normal) then '1' (to select the range of numbers you would like to be expressed in scientific notation even when everyday sized numbers are given in decimal notation).
- On Calculator 2 you should press 'SCI'. The answer then appears as 2.0^7 (meaning 2×10^7). To return to non-scientific notation press 'FLO'.
- On Calculator 3 you should press 'F-E'. The answer then appears as $2.e+7$ (meaning 2×10^7). To return to non-scientific notation press 'F-E' again.

Calculating in scientific notation

To find $\frac{1 \times 10^8}{2 \times 10^{-7}}$.

- On Calculator 1 you should press
'1' then '×10^x' then '8' then '+' then '2' then '×10^x' then '(-)' then '17' then '='
The answer is given as 5×10^{24} .
- On Calculator 2 you should press
'1' then 'EE' then '8' then '+' then '2' then 'EE' then '17' then '+⊖-' then '='
The answer is given as 5.24 (meaning 5×10^{24}).
- On Calculator 3 you should press
'1' then 'Exp' then '8' then '/' then '2' then 'Exp' then '17' then '+/-' then '='
Provided 'F-E' has been pressed, the answer is given as $5 \text{ e}+24$ (meaning 5×10^{24}).

Finding the sine of an angle

To find the sine of 30° (*Note: before doing anything else you need to ensure that your calculator is in the correct mode to calculate with angles entered in degrees*):

- On Calculator 1, to get into degrees mode, you should press 'Setup' then '3' (for degrees). Then press
'sin' then '30' then ')' then '='
- On Calculator 2, to get into degrees mode, you should press 'DRG' until 'DEG' is displayed on the screen. Then press
'30' then 'SIN'
- On Calculator 3, to get into degrees mode, you should select the 'Degrees' radio button. Then press
'30' then 'sin'

The answer, on each occasion, is given as 0.5 or $\frac{1}{2}$

Logarithms

To find the logarithm to base 10 of 0.01:

- On Calculator 1 you should press
'log' then '0.01' then ')' then '='
- On Calculator 2 you should press
'0.01' then 'LOG'
- On Calculator 3 you should press
'0.01' then 'log'

The answer, on each occasion, is given as -2.

11 Problems and whom to contact

The best way to contact the OU for virtually all sources of help is via StudentHome. There is a comprehensive FAQ section – select this option to find links to a number of related questions, answers and links to other OU websites. There is also a 'Contact us' section – follow this option to open up a page with a number of links and select the heading that best reflects what your query is about. Alternatively, you can use the Student Registration and Enquiry Service number at any time on +44 (0) 845 300 6090.

Your StudentHome page at <http://www.open.ac.uk/students> provides many points of contact

Problem/subject	Who to contact
<p>Clarification and/or help on any of the content of the module material; queries about the subject matter of specific TMAs</p> <p>Queries about non-receipt of marked TMAs</p>	<p>Your tutor; contact details are on StudentHome.</p> <p>First contact your tutor, then if necessary the Learner Support Team at your Regional Centre. (In StudentHome click on 'How to contact your Learner Support Team' for contact details.)</p> <p>After that, if you need to contact the central OU:</p> <p>Telephone: +44 (0) 1908 653051</p> <p>Write to: Assignment Handling Office The Open University PO Box 722 Milton Keynes MK7 6ZT</p>
<p>Problems contacting your tutor or anything related to tutor support</p> <p>Information about tutorial dates, times and venues</p>	<p>The Science Staff Tutor at your Regional Centre. (In StudentHome click on 'How to contact your Learner Support Team' for contact details.)</p> <p>StudentHome or the Learner Support Team at your Regional Centre. (In StudentHome click on 'How to contact your Learner Support Team' for contact details.)</p>
<p>Queries about non-receipt of, incomplete, or damaged module materials; requests for replacement materials if you lose or damage items</p>	<p>In StudentHome click on 'materials despatch'.</p> <p>Telephone: +44 (0)1908 332633</p>
<p>Queries about computer hardware and difficulties using module software</p>	<p>In StudentHome click on the 'Help' tab and then 'Computing help'.</p> <p>Telephone: +44 (0)1908 653972</p>
<p>Questions about obtaining copies of published articles, literature searches, searching the internet, databases, etc.</p>	<p>In StudentHome go to 'Services' section and click on 'Library services'.</p> <p>Telephone: +44 (0)1908 659001</p> <p>Email: library-help@open.ac.uk</p> <p>Website: www.open.ac.uk/library</p> <p>Write to:</p> <p>Library Services The Open University Walton Hall Milton Keynes MK7 6AA</p>

Advice for students with disabilities	<p>In StudentHome go to 'Services' section and click on 'Services for disabled students'.</p> <p>Telephone: +44 (0) 1908 653745</p> <p>Textphone: +44 (0) 1908 655978</p> <p>Email: disabled-student-resources@open.ac.uk</p> <p>Website: www.open.ac.uk/disability</p> <p>The Learner Support Team at your Regional Centre</p> <p>or</p> <p>Disabled Students Resource Team The Open University Hammerwood Gate Kents Hill Milton Keynes MK7 6BY</p>
All other queries, including those about registration, withdrawal, module results, change of name, change of address	<p>In StudentHome click on the 'Help' tab.</p> <p>Telephone: +44 (0)845 300 6090</p> <p>Email: general-enquiries@open.ac.uk</p> <p>Write to:</p> <p>The Learner Support Team at your Regional Centre</p> <p>or</p> <p>Student Registration & Enquiry Service The Open University PO Box 197 Milton Keynes MK7 6BJ</p>
Comments on the module itself or on the assignments (e.g. suspected errors, suggestions for improvements)	<p>The S104 Curriculum Manager Faculty of Science The Open University Walton Hall Milton Keynes MK7 6AA</p>

In all contact with the University, you should give your name and personal identifier (PI) number and module code so that we have a record of your request and can contact you. In any emails you send by selecting 'Contact us' on StudentHome your name and PI will be completed automatically.

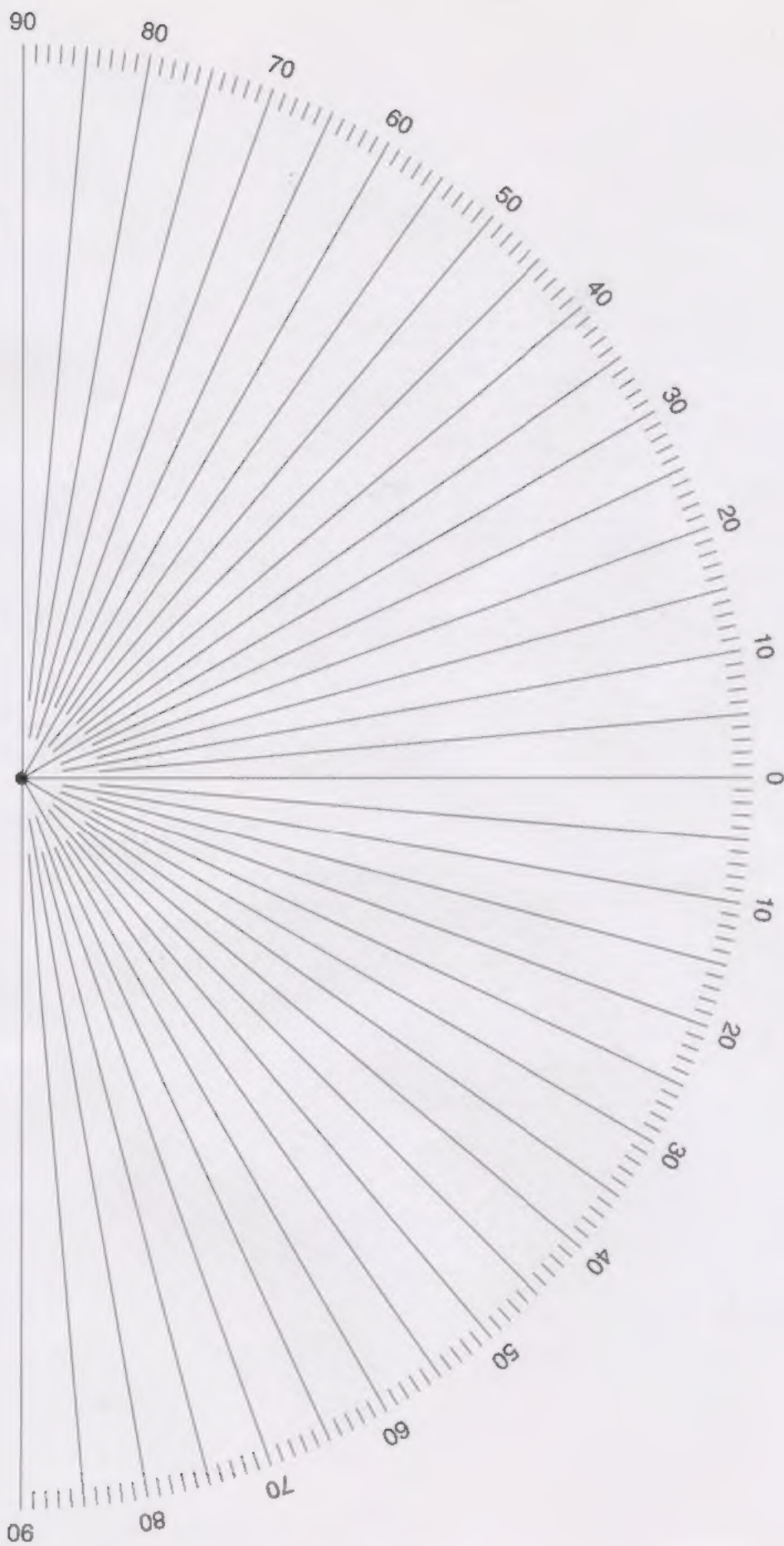


Figure 4 Paper protractor for use with Activity 11.1 in Book 3.

